

WHAT IS CLAIMED IS:

1 1. A method for high-speed, 3D imaging of optically-invisible
2 radiation, the method comprising:
3 detecting optically-invisible radiation within an environment to obtain
4 signals;
5 processing the signals to obtain stereoscopic data; and
6 displaying the stereoscopic data in the form of optically-visible
7 radiation images superimposed on a view of the environment so that a user can
8 obtain a 3D view of the radiation by utilizing natural human stereo imaging
9 processes.

1 2. The method as claimed in claim 1 wherein the environment is
2 a virtual environment.

1 3. The method as claimed in claim 1 wherein the environment is
2 an optically-visible environment.

1 4. The method as claimed in claim 1 wherein the radiation is
2 ionizing radiation.

1 5. The method as claimed in claim 4 further comprising
2 energizing material so that the material emits or deflects the ionizing radiation.

1 6. The method as claimed in claim 1 wherein the radiation is
2 infrared radiation.

1 7. A system for high-speed, 3D imaging of optically-invisible
2 radiation, the system comprising:
3 a detector subsystem for detecting optically-invisible radiation within
4 an environment to obtain signals;
5 a signal processor for processing the signals to obtain stereoscopic
6 data; and

7 a display subsystem for displaying the stereoscopic data in the form
8 of optically-visible radiation images superimposed on a view of the environment so
9 that a user can obtain a 3D view of the radiation by utilizing natural human stereo
10 imaging processes.

1 8. The system as claimed in claim 7 wherein the environment is
2 a virtual environment.

1 9. The system as claimed in claim 7 wherein the environment is
2 an optically-visible environment.

1 10. The system as claimed in claim 7 wherein the radiation is
2 ionizing radiation.

1 11. The system as claimed in claim 10 further comprising means
2 for energizing material so that the material emits or deflects the ionizing radiation.

1 12. The system as claimed in claim 7 wherein the radiation is
2 infrared radiation.

1 13. The system as claimed in claim 7 wherein the detector
2 subsystem includes a set of field or area detectors.

1 14. The system as claimed in claim 7 wherein the detector
2 subsystem includes a set of point detectors.

1 15. The system as claimed in claim 7 wherein the detector
2 subsystem includes a set of passive detectors.

1 16. The system as claimed in claim 7 wherein the detector
2 subsystem includes a set of active detectors.

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1 17. The system as claimed in claim 13 wherein the radiation is
2 gamma-ray radiation and wherein the set of field detectors includes a pair of gamma-
3 ray or other positional radiation detectors.

1 18. The system as claimed in claim 17 wherein the gamma-ray
2 cameras are scanning gamma-ray cameras and wherein each of the gamma-ray
3 cameras is capable of scanning the environment through a plurality of angles and
4 wherein the signals are processed to locate a source within the environment.

1 19. The system as claimed in claim 7 wherein the radiation is
2 ionizing radiation and wherein the detector subsystem includes a scintillator and a
3 collimator for directing the ionizing radiation into the scintillator.

1 20. The system as claimed in claim 19 wherein the scintillator is
2 curved.

1 21. The system as claimed in claim 7 wherein the detector
2 subsystem includes a compound eye detector.

1 22. The system as claimed in claim 21 wherein the compound eye
2 detector includes a plurality of individual detectors.

1 23. The system as claimed in claim 22 wherein the plurality of
2 individual detectors are movable independently or as a group.

1 24. The system as claimed in claim 21 wherein the compound eye
2 detector includes a single detector movable in three dimensions.

1 25. The system as claimed in claim 14 wherein the signal
2 processor processes the signals to obtain a 3D map of radiation-emitting sources.

1 26. The system as claimed in claim 7 wherein the detector
2 subsystem has stereoscopic capabilities.

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1 27. The system as claimed in claim 7 wherein the detector
2 subsystem is portable.

1 28. The system as claimed in claim 7 wherein the display
2 subsystem includes a see-through display subsystem and wherein the system further
3 includes a tracking system for tracking the display subsystem.

1 29. The system as claimed in claim 28 wherein the display
2 subsystem is head-mountable.

1 30. The system as claimed in claim 7 wherein the system provides
2 real-time visual feedback about location and relative strength of at least one
3 radiation-emitting source.

1 31. An ionizing radiation detector comprising:
2 an ionization substrate for converting ionizing radiation into a signal;
3 a converter coupled to the substrate for converting the signal into a
4 corresponding electrical signal; and
5 a positioner for moving the substrate in three dimensions to image
6 over a surface of a sphere.

1 32. The detector as claimed in claim 31 wherein the substrate is
2 a scintillator for converting ionizing radiation into photons of light.

1 33. The detector as claimed in claim 32 wherein the signal is an
2 optical signal and the converter is a photodetector.

1 34. The detector as claimed in claim 32 wherein the signal is an
2 optical signal and the converter is a multiplier phototube.

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1 35. An array of detectors wherein each of the detectors is a
2 detector as claimed in claim 31 and wherein the detectors are arranged in a
3 curvilinear geometry.

1 36. The array as claimed in claim 35 wherein the detectors are
2 arranged so that the array forms a substantially hemispherical device.

1 37. The array as claimed in claim 35 wherein the substrates of the
2 detectors are formed from separate materials.

1 38. An ionizing radiation detector comprising:
2 an ionization substrate formed from a single material and having a
3 curved first surface and a second surface opposing the first surface for converting
4 ionizing radiation at the curved first surface into a signal; and
5 a radiation shield disposed at the second surface to substantially block
6 ionizing radiation at the second surface.

1 39. The detector as claimed in claim 38 wherein the radiation
2 shield is a fanned collimator.

1 40. The detector as claimed in claim 38 wherein the ionization
2 substrate is a curved scintillator for converting ionizing radiation into photons of
3 light.

1 41. The detector as claimed in claim 38 wherein the ionization
2 substrate is a semiconductor substrate.

1 42. The detector as claimed in claim 38 wherein the detector forms
2 a substantially hemispherical device.

1 43. The detector as claimed in claim 38 wherein the second surface
2 is curved and is substantially parallel to the curved first surface.